

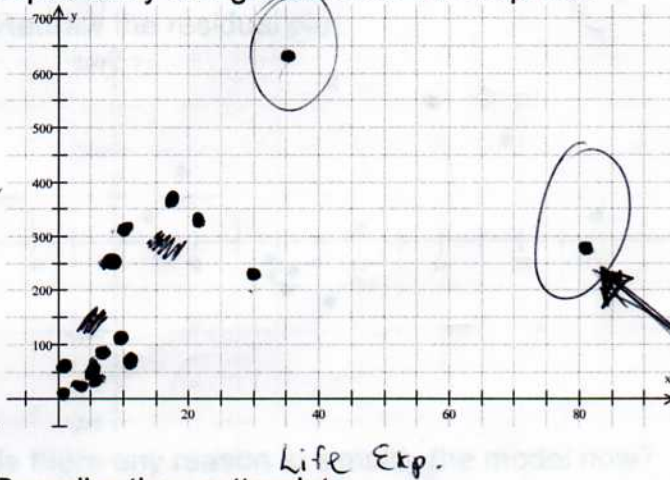
AP Statistics Altering LSRL (9D)

Key

The following table shows the gestation period (in days) and life expectancy (in years) for 18 species of mammals. Is there evidence that gestation period is related to the animal's lifespan?

Animal	Gestation (days)	Life Expectancy (yrs)
Ass	365	19
Cat	63	11
Cow	280	10.5
Dog	62	11
Elephant	624	35
Fox	57	9
Goat	151	12
GuineaPig	88	3
Hamster	16	2
Hippo	240	30
Horse	336	22.5
Lion	108	10
Human	278	81
Pig	115	10
Rabbit	31	7
Sheep	151	12
Squirrel	44	8.5
Wolf	61	11

1. Create the scatterplot with life expectancy as the explanatory and gestation as the response



2. Describe the scatterplot.

mod. weak, linear, positive, 1 outlier (humans)

3. Are there any outliers? What are they?

humans @ (278, 81), elephants

4. Are there any influential points? What are they?

humans, elephants

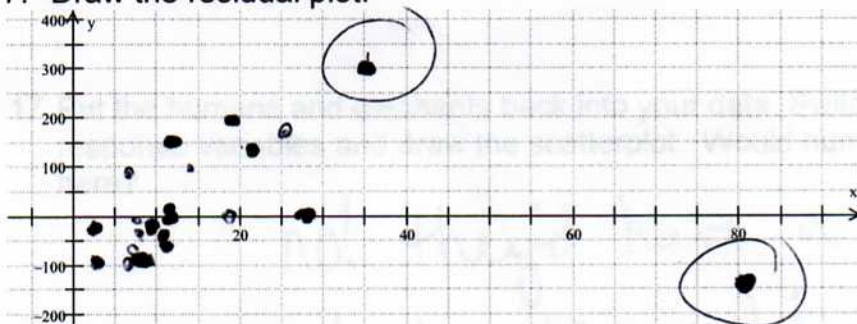
5. Are there any points with high leverage? What are they?

humans

6. Calculate the LSRL and find the correlation.

$$\hat{y} = 90.625 + 0.4725x \quad r = 0.544$$

7. Draw the residual plot.



8. From the residual plot how can you tell if a point is an outlier, an influential point or has high leverage?

outlier in x-variable on the plot

high resid. or outlier in x

high resid

- * humans are very different animals than the others
9. Can we remove a point to make a stronger linear model? Do you think we are justified in doing so?

yes! remove humans! very influential

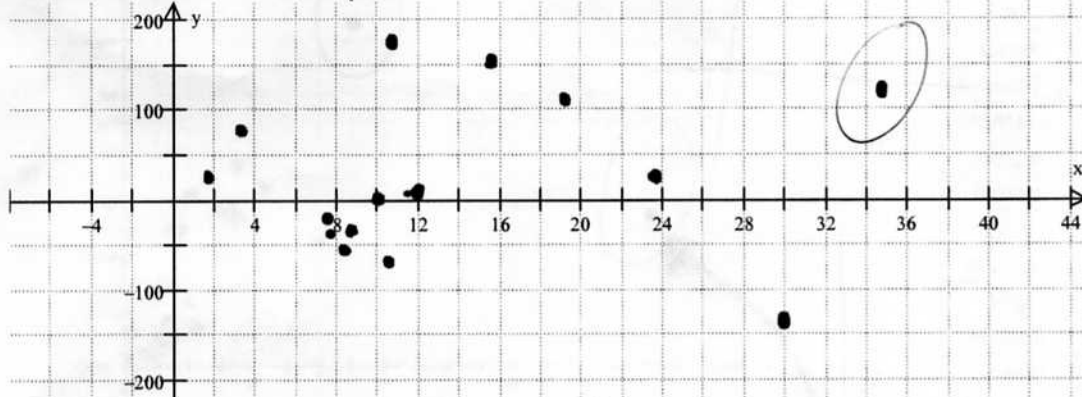
10. Remove the humans and recalculate the LSRL and correlation.

$$\hat{y} = -39.517 + 15.498x \quad r = \cancel{0.5008} \\ 0.85$$

11. Did the model improve? How can you tell?

yes! look @ scatterplot - more linear. r is higher

12. Redraw the residual plot.



13. Is there any reason to simplify the model now?

maybe - elephants

14. Remove the elephants and recalculate the LSRL and correlation.

$$\hat{y} = -1.271 + 11.609x \quad r = \cancel{0.5008} \\ 0.727$$

15. Were elephants an influential point?

somewhat - they changed the slope a bit

16. Should we continue to remove animals from the model to improve the strength of the model?

no!

17. Put the humans and elephants back into your data. Switch the explanatory and response variables and draw the scatterplot. Would humans have high leverage here?

no! they'd have a high residual
elephants would have leverage